IJAE
Vol. 120, n. 1 (Supplement): 55, 2015
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

Ultrastructural aspects of articular cartilage and sub-chondral bone in patients affected by post-traumatic shoulder instability: preliminary observations

Paolo Baudi[1], Gabriele Campochiaro[1], Manuela Rebuzzi[1], Marzia Ferretti[2], Fabio Serafini[1], Fabio Catani[1], Carla Palumbo[2]

[1] Department of Orthopaedic Surgery, Azienda Ospedaliero-Universitaria Policlinico di Modena, Modena, Italy - [2] Department of Biomedical, Metabolic and Neural Sciences, University of Modena and Reggio Emilia, Modena, Italy

Post traumatic shoulder instability is a frequent condition in young active population. Notwithstanding a lot of data have been collected on capsular-legament lesions and gleno-humeral defects, no data are available on early ultrastructural ostheo-condral damages that are known to be highly associated with the onset of invalidating pathologies, like osteoarthritis (OA). Thus, the mechanisms of joint instability and the identification of which components in the articular complex are primarily affected in instability are of clinical significance, particularly in the light of deepening knowledge on the onset/development of OA. In the present study, biopsies of the articular cartilage and sub-chondral bone were taken from 10 patients (aged 26-40) underwent surgery in Policlinico of Modena. The withdrawals were immediately fixed and embedded for Transmission Electron Microscopy (TEM). The observations were performed in tangential, arcuate, and radial layers of the articular cartilage as well as in sub-chondral bone. TEM observations showed that chondrocytes in the superficial layers (i.e. tangential and arcuate) display normal and very well preserved ultrastructure, probably due to synovial liquid supply; otherwise, chondrocytes in the radial layer (not only in calcified but also in the un-calcified one) show various degrees of degeneration, with cytoplasm partially coerced and variously-sized vacuoles, both signs of suffering; occasionally, in the radial layer, chondrocytes with morphological signs of apoptosis or autophagy were also observed. As far as sub-chondral bone is concerned, osteocytes next the deeper calcified cartilage (within 80-100 micra from the cement line) also show evidences of degeneration, while osteocytes more distant from the osteo-chondral border display normal ultrastructure probably due to the vascular bone supply. In all patients of the study, the ultrastructural features of osteo-chondral complex are not depending on age. The present study represents the first ultrastructural investigation of the articular osteo-chondral complex in shoulder instability, evaluating the state of preservation/viability of both chondrocytes and osteocytes throughout the successive layers of the articular cartilage and sub-chondral bone. These preliminary observations are the basis to understand if the early surgical treatment in shoulder instability could avoid the onset of OA.

Keywords
Shoulder instability; cell ultrastructure; chondrocyte; osteocyte.